B.Sc. DEGREE EXAMINATION,APRIL 2020
II Year IV Semester
Allied Mathematics-II

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Find a_0 and a_n of the Fourier series for the function $f\ (x) = x$ in the interval $[-\pi, \pi]$.
2. Write the Bernoulli's formula.
3. Solve : $pq = n$.
4. Solve : $\sqrt{p} + \sqrt{q} = x$.
5. Evaluate Laplace transform of $[(1 + t)^2]$.
6. Find the Laplace transforms of $\sin(2t + 3)$.
7. Find Inverse Laplace transform of $\left[\dfrac{s+3}{s^2-9}\right]$.
8. Find the inverse Laplace transform of $\frac{1}{(s+a)^2}$.
9. If $\phi = x^2y - 2y^2z^3$ find $\nabla\phi$ at the point (1, – 1, 1)
10. Prove that grad $(\phi + \psi)$ = grad (ϕ) + grad (ψ).
11. Define Solenoidal vector.
12. Form the PDE by eliminating arbitrary constants a and b from $z = ax + by + a^2 + b^2$.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Find the Fourier series for the function $f\ (x) = x^2$ in $-\pi \leq x \leq \pi$.
14. Eliminate the arbitrary function f from $f\ (xy + z^2, x + y + z) = 0$.
15. Evaluate Laplace transform of [te^{--t} sint]
16. Show that Inverse Laplace transform of $\left[\log\left(\dfrac{s+1}{s-1}\right)\right] = \dfrac{e^t - e^{-t}}{t}$
17. Find the directional derivative of $\phi = 4xz^2 + x^2yz$ at the point (2, –1, 2) in the direction of $2\,\vec{i} + 3\,\vec{j} + 4\,\vec{k}$.
18. Show that $\vec{F} = (4xy - z^3)\,\vec{i} + 2x^2\vec{j} - 3xz^2\vec{k}$ is irrotational.
19. Solve : $p^2 + q^2 = x + y$.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Find the Fourier series for the function $f\ (x) = x$ sin$x$ in $-\pi \leq x \leq \pi$
21. Solve : $(mz - ny)$ p + $(nx - lz)$ q $= ly - mx$.
22. Find a) Laplace transform of $\left[\frac{e^{at} - \cos bt}{t}\right]$, b) Laplace transform of $\left[\frac{e^{at} - e^{bt}}{t}\right]$.
23. Evaluate Inverse Laplace transform of $\left[\frac{5s+3}{(s-1)(s^2+2s+5)}\right]$.
24. Verify the Green's theorem for $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where c is the boundary of the region R enclosed by the straight line $y = 0$, $x + y = 1$, $x = 0$.

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Section C $(3 \times 10 = 30)$ Marks

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21. Solve : $(mz - ny)$ p $+$ $(nx - lz)$ q $= ly - mx$.
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